

NASA-CR-116697) BOILERPLATE NO. 13,
SPACECRAFT SATURN RESEARCH AND DEVELOPMENT
EST SA-5 SPECIFICATION (North American
aviation, Inc.) 11 p

N79-76367

00/18 Unclas
11213

FF No. 602(B)

| | | |
|-------------------------------|----------------|------------|
| (ACCESSION NUMBER) | 11 | 7007e |
| (PAGES) | | (CODE) |
| (NASA CR OR TMX OR AD NUMBER) | NASA-CR-116697 | (CATEGORY) |

~~CONFIDENTIAL~~

065-8826 14
~~265-11383~~
e

SINGLE COPY ONLY

Copy #1

SID 62-217

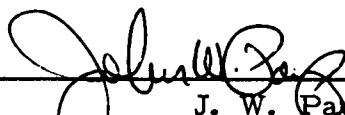
BOILERPLATE NO. 13, SPACECRAFT
SATURN RESEARCH AND DEVELOPMENT
TEST SA-5 SPECIFICATION
(Unclassified)
NAS 9-150

28 February 1962

4.5.2.3



Approved by


J. W. Paup

Vice President and Apollo Program Manager

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18 U.S.C. Section 793 and 794. Its transmission or revelation of its contents in any manner to an unauthorized person is prohibited by law.

~~DOWNGRADED 1 YEAR
INTERVALS, RECLASSIFIED AFTER
12 YEARS OF DIR 5200.10~~

NORTH AMERICAN AVIATION, INC.
SPACE and INFORMATION SYSTEMS DIVISION

~~CONFIDENTIAL~~

CLASSIFICATION CHANGE

To UNCLASSIFIED

By authority of John W. Paup Date 12/1/62
Changed by L. Shirley
Classified Document Mastey Control Station, NASA
Scientific and Technical Information Facility

~~CONFIDENTIAL~~

CONTENTS

| <u>Paragraph</u> | <u>Title</u> | <u>Page</u> |
|------------------|---|-------------|
| 1. | SCOPE | 1 |
| 1.1 | Scope | 1 |
| 2. | APPLICABLE DOCUMENTS | 1 |
| 2.1 | General | 1 |
| 3. | REQUIREMENTS | 1 |
| 3.1 | General | 1 |
| 3.2 | Components | 1 |
| 3.2.1 | Arrangement | 1 |
| 3.2.1.1 | Command Module | 3 |
| 3.2.1.2 | Service Module | 3 |
| 3.2.1.3 | Adapter Prototype | 3 |
| 3.2.1.4 | Launch Escape Tower Prototype | 3 |
| 3.2.2 | Equipment | 3 |
| 3.3 | Performance | 3 |
| 3.3.1 | General | 3 |
| 3.4 | Design and Construction | 4 |
| 3.4.1 | General | 4 |
| 3.4.2 | Weight | 4 |
| 3.4.3 | Heat Shielding Simulation | 4 |
| 3.5 | Ground Support Equipment | 4 |
| 3.5.1 | General | 4 |
| 4. | QUALITY ASSURANCE PROVISIONS | 4 |
| 4.1 | General | 4 |
| 4.2 | Inspections and Tests | 4 |
| 5. | PREPARATION FOR DELIVERY | 4 |
| 5.1 | Airborne Equipment | 4 |
| 5.2 | Transportation | 5 |
| 6. | NOTES | 5 |
| 6.1 | Definitions | 5 |

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

APPENDICES

| <u>Appendix</u> | | <u>Page</u> |
|-----------------|---|-------------|
| I-A | Government-Furnished Property, Contractor-Installed, Communication and Instrumentation . . | 6 |
| I-B | Contractor-Furnished Equipment, Contractor-Installed, Communication and Instrumentation . . | 7 |
| I-B | Contractor-Furnished Equipment, Contractor-Installed, Power System | 8 |

ILLUSTRATIONS

| <u>Figure</u> | <u>Page</u> |
|---------------|-------------|
| 1 | 2 |

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

1. SCOPE

1.1 Scope. - This specification covers the requirements for the Spacecraft Saturn Research and Development Test SA-5 Boilerplate. The boilerplate shall provide demonstrations and obtain information relative to the flight characteristics of the Apollo Spacecraft and Saturn booster.

2. APPLICABLE DOCUMENTS

2.1 General. - The following documents shall form a part of this specification.

Government Documents

Air Force

ARDCM-80-1,
Volume 1

Handbook of Instructions for
Aircraft Designers

National Aeronautics and Space Administration

NCP200-2

Quality Assurance Provisions for
Space Contractors, 15 December 1961

Space and Information Systems Division, North American Aviation, Inc.

SID 62-240

Preparation for Delivery of Airborne
Equipment, General Requirements For

3. REQUIREMENTS

3.1 General. - The external configuration of the boilerplate shall be similar to the configuration of the prototype Apollo Spacecraft. The configuration of the boilerplate is shown in figure 1.

3.2 Components. -

3.2.1 Arrangement. - Equipment and ballast will be arranged in the boilerplate to simulate the center of gravity of the prototype Spacecraft. The boilerplate shall include the following:



~~CONFIDENTIAL~~

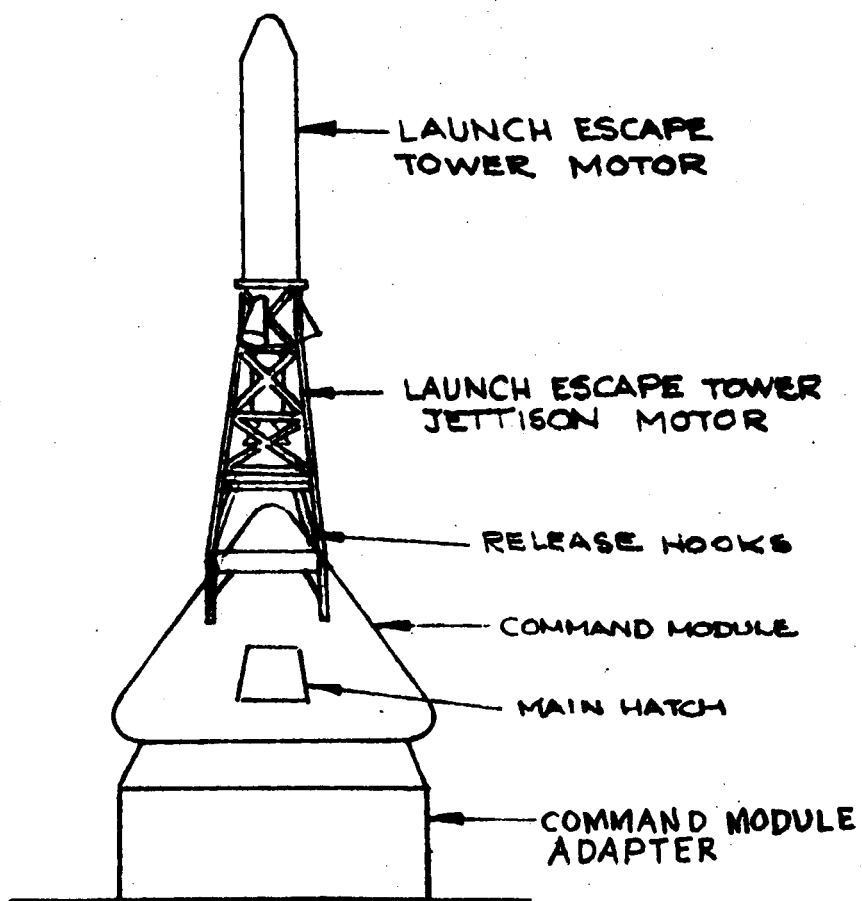


Figure 1. Boilerplate No. 13

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

- (a) Command Module
- (b) Service Module
- (c) Adapter
- (d) Escape Tower

3.2.1.1 Command Module. - The command module of the boilerplate shall include provisions for mating to the service module, and attachment of the launch escape tower. Provisions for separation of the spacecraft from the booster shall not be required. The command module shall include:

- (a) Communications and Instrumentation System
- (b) Environmental Control System (as required for system cooling)

3.2.1.2 Service Module. - The service module of the boilerplate shall include provisions for mating to the adapter boilerplate, and the command module. The service module shall include:

- (a) Communications and Instrumentation System
- (b) Environmental Control System (Ground Cooling Only)
- (c) Battery Power Supply System

3.2.1.3 Adapter Prototype. - The adapter prototype shall include provisions for mating to the service module boilerplate, and the saturn booster. The adapter prototype shall contain instrumentation.

3.2.1.4 Launch Escape Tower Prototype. - The launch escape tower prototype shall have provisions for attachment to the command module of the boilerplate.

3.2.2 Equipment. - The equipment for the boilerplate shall include the equipment listed in Appendix I-A and I-B.

3.3 Performance. -

3.3.1 General. - The Saturn research and development test SA-5 boilerplate shall simulate the dynamic characteristics of the final Apollo Spacecraft. The boilerplate shall be a research and development test vehicle and shall be tested on the Saturn SA-5 launch vehicle. The boilerplate shall:

~~CONFIDENTIAL~~

- (a) Demonstrate dynamic compatibility of spacecraft and the C-1 boost system.
- (b) Provide structural demonstration for evaluation of flight loads, vibration, accelerations and temperature.
- (c) Evaluate the capability of obtaining orbital altitude range: 90 to 400 nm.

3.4 Design and Construction. -

3.4.1 General. - ARDCM-80-1, Volume 1, shall be used for guidance and reference material in the design and construction of the boilerplate.

3.4.2 Weight. - The boilerplate shall have a mass and center of gravity similar to the mass and center of gravity of the prototype Apollo Spacecraft.

3.4.3 Heat Shielding Simulation. - The boilerplate shall not contain heat shielding. The stiffness of the heat shielding of the spacecraft shall be simulated in the boilerplate.

3.5 Ground Support Equipment. -

3.5.1 General. - Ground support equipment shall be required to transport, demonstrate and test the boilerplate. The requirements for ground support equipment are not part of this specification.

4. QUALITY ASSURANCE PROVISIONS

4.1 General. - Quality Assurance Provisions for the boilerplate shall be in accordance with the applicable portions of NASA Bulletin NCP200-2.

4.2 Inspections and Tests. - Inspections and tests to determine conformance of the boilerplate to contract and specification requirements shall be conducted prior to submission of the boilerplate to NASA or in the presence of an NASA representative. Results of inspection tests on major components shall be submitted to NASA for review. Other acceptance test data relative to this specification shall be maintained and made available for review to NASA upon request.

5. PREPARATION FOR DELIVERY

5.1 Airborne Equipment. - Airborne Equipment shall be prepared for delivery in accordance with Specification SID 62-240.

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

5.2 Transportation. - The boilerplate shall be delivered to the local area testing site.

6. NOTES

6.1 Definitions. - A boilerplate is a simulated spacecraft module for pre-developmental and/or developmental tests leading to the design of a prototype module.

~~CONFIDENTIAL~~Appendix I-AGovernment-Furnished Property, Contractor-InstalledCommunication and Instrumentation

| <u>Item No.</u> | <u>Quantity</u> | <u>Description</u> | <u>Part No.</u> |
|-----------------|-----------------|--------------------------|-----------------|
| 1 | 1 Set | Sensors | |
| 2 | 2 | Recorders | |
| 3 | 4 | Telemetry Systems | |
| 4 | 4 | VHF Transmitters | |
| 5 | 1 | Command Receiver/Decoder | |
| 6 | 2 | C-Band Beacons | |
| 7 | 1 | Minitrack Beacon | |
| 8 | 1 | S-Band Beacon | |
| 9 | 1 | RF Multiplexer | |
| 10 | 1 | UHF Z-Match | |
| 11 | 4 | C-Band Antenna Elements | |
| 12 | 1 | Coaxial Switch | |
| 13 | 2 | Power Dividers | |
| 14 | 1 | Power Source | |

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~Appendix I-BContractor-Furnished Equipment, Contractor-Installed

| <u>Item No.</u> | <u>Quantity</u> | <u>Description</u> | <u>Part No.</u> |
|-----------------|-----------------|-------------------------|-----------------|
| 1 | 1 | RF Transmission Line | |
| 2 | 8 | Slot Antennas | |
| 3 | 4 | S-Band Antenna Elements | |

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~Appendix I-BContractor-Furnished Equipment, Contractor-Installed

| <u>Item No.</u> | <u>Quantity</u> | <u>Description</u> | <u>Part No.</u> |
|-----------------|-----------------|--------------------|-----------------|
| 1 | 1 | Battery, Main | |

~~CONFIDENTIAL~~